software to deliver a network architecture capable of delivering Internet services in a reliable manner. This configuration will scale independently as the subscriber base and service offerings grow. This approach uses lower-end hardware and software from best of breed hardware and software manufacturers that allows the ISP Franchise to scale incrementally.

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For more information about CSA, refer to the CSA Technical Description.

Figure 4 shows the process for access services.

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ensoOS™

The ISP Franchise has at its disposal a suite of back office management systems to manage its ISP business. All back office systems are developed and supported by ensoport.com™, Inc. The back office management systems utilize a client-server network architecture, where client software runs on the ensoBox™ and server software runs at the ensoport.com™ data center. Communications between the ensoBox™ and ensoport.com™ data center is secured through a Virtual Private Network (VPN).

ensoOS™ allows the ISP Franchise to provision subscribers, manage subscriber accounts, bill subscribers, access reports, and monitor the ensoBox™. These applications are part of the ensoOS™ tools and consist of the following:

> *ensoAdmin* – creates Franchise subscribers and assigns them to group-based services.
>
> *Service Builder* – creates service policies and service plans for flexible billing models.
>
> *Account Manager* – add, delete, and modify subscriber accounts and assign service plans to subscribers.
>
> *Provisioner* – receives requests from Account Manager, and uses information input into Account Manager and creates an account in the subscriber database.
>
> *Biller* – creates bills to bill subscribers based on system usage and service plan. It also provides monetary settlement between Franchises and ensoport.com™, Inc.
>
> *Report Manager* – creates business reports to analyze everything from network utilization to help desk ticket response time.
>
> *Help Desk* – a means for subscribers to resolve problems with their ISP service.
>
> *Command Center* – monitors system usage and utilization.

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For more details about ensoOS™ and Applications Infrastructure refer to the ensoOS™ Technical Description.

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Network Monitoring and Management

All components of the ensoBox™ are remotely monitored by the ensoport.com™ Network Operations Center (NOC) 24x7x365. ensoBox™ components are managed in one of three (3) ways:

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1. Over the Internet via a telnet connection to the component's network interface.
2. Over the Internet via a telnet connection to an accompanying console server.
3. Via a direct dial connection to a serially attached modem.

10   Local network monitoring and management is provided by the Command Center. The Command Center is an ensoOS™ application that runs on the ensoBox™. SNMP traps set off alarms when failures occur and also provide real-time performance statistics of the ensoBox™ such as:

Bandwidth utilization.

Available memory.

CPU processing.

Port monitoring.

Modem monitoring.

Modem speed.

Modem usage.

Disk usage.

Cache efficiency (hit rates).

I/O statistics.

Disk usage.

NAS Filer usage.

Server monitoring.

Component temperatures.

ensoBox™ Features and Functionality

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The following section describes the features and functionality of the ensoBox™. These features are traditionally standard for all ISPs and provide the foundation for supporting and growing a successful ISP business.

35   The ensoBox™ supports the following features and functionality:

Hot Deploy (remote server application management)

Time synchronization

PPP (Point-to-Point Protocol) dial up access

Password Authentication Protocol (PAP)

AAA (Authentication, Authorization, Accounting)

5   DNS

Dynamic source IP addressing

Network based data storage

Data backup

Content caching

10   Content filtering

Security

Hot Deploy

Hot Deploy is a means for the ensoport.com™ NOC to manage the operating system and applications installed on the application servers configured in the ensoBox™. It automatically installs the Sun Solaris operating system, related patches, software, system configuration parameters, ensoOS™, and ensoport.com™ developed services on the ensoBox™ Front End Processors (FEPs). In the event of a failure or server shutdown, Hot Deploy remotely restores the FEP operating system and software images.

Time Synchronization

Network Time Protocol (NTP) synchronizes the clock on all of the components of the ensoBox™. An NTP stratum one server uses the time (in Greenwich Mean Time) provided by Global Positioning Service (GPS) receivers. Stratum One servers are public domain and are located throughout the Internet. They are typically privately owned and operated to ensure precision time all the time. Servers, routers, switches, etc. synchronize their internal clocks with the NTP stratum one server to ensure clock consistency amongst the ensoBox™ components. This is important for supporting time critical applications and collecting accurate accounting records from the RADIUS server. Time synchronization ensures billing is correct and accurate.

Point-to-Point Protocol (PPP)

Subscribers' computers connect to the ensoBox™ modems via a PPP session. PPP is the Internet Standard for transmission of IP packets over serial lines. PPP supports asynchronous and synchronous communication lines. The standard for PPP is RFC 1661.

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